

CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1] In the storage battery by which it has SEPARATA molded between the anode containing a metal oxide or metal hydroxide, the negative pole containing a hydrogen storing metal alloy, and said anode and the negative pole. The nickel metal hydride storage battery characterized by the thing in said anode or the negative pole done for the application formation of the insulating layer at the edge at least at any one electrode.

[Claim 2] said insulating layer -- a synthetic resin -- the nickel metal hydride storage battery according to claim 1 characterized by things

[Claim 3] In the method of ***[ing] the seal object which fills up an inside with an electrolysis solution and has an anode cap to the up side after forming an electrode group after winding through SEPARATA between said anode and the negative pole, and inserting said electrode group into a case, and manufacturing a storage battery. The production method of the nickel metal hydride storage battery characterized by including the process in which make it dry and an insulating layer is made to form after applying a synthetic resin to the edge of any one electrode at least among said anode and the negative pole.

[Claim 4] It is the production method of the nickel metal hydride storage battery according to claim 3 characterized by the thickness of said insulating layer becoming 0.05-0.5mm. $\approx 20-200\mu$

[Claim 5] Said insulating layer is the production method of the nickel metal hydride storage battery according to claim 2 characterized by one either becoming among phenol resin, an epoxy resin, silicone resin, polyethylene, polypropylene, and a fluoro-resin.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a nickel metal hydride storage battery and its production method. It is related with the nickel metal hydride storage battery it is made to have generating of the shot by omission of the active material which carried out application formation of the quality of an insulator of a resin agent etc. prevented by the edge of the electrode especially wound around the inside of a case, and its production method.

[0002]

[Description of the Prior Art] [a storage battery] generally although a nickel metal hydride storage battery uses the characteristic of a hydrogen storing metal alloy and the hydrogen storing metal alloy to which occlusion of the hydrogen was reversibly carried out by the Electrochemistry Sub-Oxidation reaction within the alkali electrolysis solution like the solid of hydrogen gas, the gas reaction, etc. If this uses a hydrogen storing metal alloy as an electrode

and the reduction reaction in an alkali electrolysis solution is caused, while water will be decomposed. The hydrogen which hydrogen and H^{+} ion came to be generated on the surface of the hydrogen storing metal alloy, and was generated from said hydrogen storing metal alloy is diffused inside an alloy, by carrying out occlusion, makes a metal hydride generate and comes to perform a restoration reaction.

[0003] Furthermore, it comes to perform an electric discharge reaction by being contrary to this, and hydrogen in the metal hydride which causes oxidation reaction reacting with H^+ ion on the surface of an alloy, and making water generate.

[0004] [the structure of such a nickel metal hydride storage battery] The anode (1) of the shape of a sheet which contains a metal oxide or metal hydroxide as shown in drawing 1. Mind between the negative pole (2) of the shape of a sheet containing a hydrogen storing metal alloy, and said anode (1) and the negative pole (2), make SEFARETA (3) in which an insulation is made to be performed laminate, it is wound spirally, and an electrode group (4) is formed. This electrode group (4) is connecting the negative pole (2) to this case (5) with the negative pole lead (6) while being *** (ed) in the case (5) of cathode terminal combination

[0005] Furthermore, the inside of said case (5) top is equipped with the seal object (8) which made the anode cap (8a) form in the bottom through annular packing (7). When the pressure inside a battery rises rapidly in this seal object (8), the metal spring (9) raises a seal object and it is made to make internal gas erupt into the atmosphere is installed elastically, and said seal object (8) and the anode (1) are electrically connected by the anode-lead (10).

19081

[Problem to be solved by the invention] by the way, " -- [the conventional nickel metal hydride storage battery constituted like] [meet / whether the start end around which an anode and the negative pole are wound spirally meets, or / the edge by the side of the upper and lower sides of an anode and the negative pole] Or while the shot occurred and the life of the storage battery was notably shortened by this by the cause of " " " which is the hydrogen storing metal alloy formed on the surface of the electrode in the manufacturing process at the time of advance of charge and discharge dropping out, there was a problem of capacity falling;

[0017] Moreover, in order to solve such [conventionally] a problem, while making thickness form in a difference in the weight of SEPARATA minded between an anode and the negative pole, respectively and preventing degradation of the cycle length by a short circuit. The nickel metal hydride storage battery with which enabled it to be satisfied of capacity is indicated by JP-H3-59957, A, and this Faira No. 39858 [three in] gazette.

[0008] By the way, the electrolysis solution distribution between about [that supply of an electrolysis solution becomes difficult] and an electrode group is uneven. By the increase in the pressure by generating of gas, a problem is in stability and the weight of SEFARETA especially [in smelting, and closing in] The defective fraction increased by generating of a

shot etc. and there was a problem that the work by which the weight of SEFARETA inserts an electrode group into a case also in size, and about [that the capacity of a battery decreases in being thick] and a manufacturing process was very difficult,

[0009] Then, are made in order that this invention may solve the above various problems, and [the purpose of this invention] between an anode and the negative poles -- always -- a law -- while generating of the shot by contact between the negative pole and an anode is prevented as an interval is held, and decreasing a defective fraction notably, it is in offering the nickel metal hydride storage battery which can extend the life of a storage battery further, and its production method

[0010]

[Means for solving problem] [the nickel metal hydride storage battery by this invention] in order to attain the purpose like the above in the storage battery by which it has SEFARETA wound between the anode containing a metal oxide or metal hydroxide, the negative pole containing a hydrogen storing metal alloy, and said anode and the negative pole it is characterized by the thing in said anode or the negative pole done for the application formation of the insulating layer at the edge at least at any one electrode.

[0011] [furthermore, the production method of the nickel metal hydride storage battery by this invention] in the method of ***[ing] the seal object which fills up an inside with an electrolysis solution and has an anode cap to the up side after forming an electrode group after winding through SEFARETA between an anode and the negative pole, and inserting said electrode group into a case, and manufacturing a storage battery After applying a synthetic resin to the edge of any one electrode at least among said anode and the negative pole, it is characterized by including the process in which make it dry and an insulating layer is made to form.

[0012]

[Mode for carrying out the invention] One work example by this invention is hereafter explained in full detail over the accompanying drawings 2 and 4.

[0013] In a figure, the same name and the same mark are written together about the same composition as the conventional composition, and detailed explanation is omitted.

[0014] First, the insulation layer forming process which this invention applies the insulating layer (20) of synthetic resin material to the edge of any one electrode at least among the anode (1) of the shape of a sheet containing a metal oxide or metal hydroxide, and the negative pole (2) of the shape of a sheet containing a hydrogen storing metal alloy, and is dried and said anode (1). And the winding process which is made to wind SEFARETA (3) of an insulation material, winds spirally in the back, and forms an electrode group (4) between the negative poles (2). It consists of an insertion process to the case (5) of the cylindrical electrode group (4) formed at this winding process, and a process which fills up the inside of said case (5) with electrolysis solutions, such as VASEKARL, and makes a seal object (6) fix to a top

opening through packing (2)

[0015] Furthermore, in said insulation layer forming process, as shown in drawing 4 A, application formation of the insulating layer (20) of predetermined width is carried out to the lengthwise direction at the edge of an anode (1) or the negative pole (2), for example, the start end of the electrode wound through SEPARATE (3).

[0016] As said insulating layer (20) is not limited to the thing made to form in the start end of an anode (1) or the negative pole (2) to a lengthwise direction, for example, it is shown in drawing 4 B As an insulating layer (20) can also be made to form in the edge by the side of one of one among the up-and-down side edge part of said anode (1) or the negative pole (2) and it is shown in drawing 4 C As an insulating layer (20) can also be made to form in the start end of an anode (1) or the negative pole (2), and an up-and-down side edge part and it is shown in drawing 4 D The insulating layer (20) which has predetermined thickness and width can also be made to form in right and left of an anode (1) or the negative pole (2), and each up-and-down edge.

[0017] Moreover, being formed by a synthetic resin is desirable still more desirable, thermosetting resin, for example, phenol resin, an epoxy resin, silicone resin, etc. are applied, Japanese lacquer and thermoplastics, for example, polyethylene, polypropylene, a fluororesin, etc. are applied, and it deals in said insulating layer (20).

[0018] Furthermore, after said insulating layer (20) made the edge of any one electrode in an anode (1) or the negative pole (2) immersed into resin of a liquid state, [can make it able to dry, and can form, or can apply with the means of injection or a brush, and] in 0.05mm closing in, when inter-electrode letter-breaking-off-the-relation void becomes poor and the application work made to form so that it may have predetermined thickness, in being thicker than 0.3mm becomes difficult, so for the thickness of an insulating layer (20), it is fairly desirable to be formed with the thickness of 0.05mm - about 0.3mm

[0016] Moreover, as for the viscosity of the resin with which the application work of an insulating layer (20) becomes easy in said insulation layer forming process, it is still more desirable that at least 5,000 - 50,000 cP is held.

0020

Ordering examples

(Work example 1) [a nickel sintered compact / type / which makes this fill up with a nickel oxide or nickel hydroxide as gas / sintering] A sheet-like anode (1) is manufactured by the FESUTO formula which makes this install a nickel oxide or a nickel hydrogenation thing for a porous metal as gas. After making the powder of a hydrogen storing metal alloy stick by pressure by making porous metals, such as a metal network, a FCHCHHNSU metal, and an extract funded metal, into gas. After installing into the gas which makes powder of a hydrogen storing metal alloy the shape of a FESUTO type in the sintering type to sinter, and consists of

said porous metal and drying it, the negative pole (2) is manufactured by the PRESSURE type which sticks by pressure by a plate etc. and is formed in the shape of a sheet.

[0021] Furthermore, the negative pole (2) which applied the epoxy resin, made the insulating layer (20) form so that it may have the thickness of 0.1mm in the start end and up-and-down side edge part of said negative pole (2), and had said insulating layer (20) formed. After winding where SEPARATA (3) is minded, and forming an electrode group (4) between the anodes (1) in which the insulating layer (20) is not formed. After making it insert into a case (5), the electrolysis solution was made to charge, the seal object (6) which has an anode cap (3a) through packing (7) in the opening of said case (5) top was combined, and the storage battery was done.

[0022] Under the present circumstances, the defective fraction by the shot at the time of the early stages of the storage battery manufactured by this invention or charge and discharge is shown in Table 1, and the degradation rate of the storage battery by the cycle characteristic at the time of charge and discharge was shown in Table 2.

[0023] Apply an epoxy resin to a lengthwise direction with the thickness of 0.1mm, and an insulating layer (21) is formed in the edge of the start end of the anode (1) and the negative pole (2) which were manufactured by the same method as the above-mentioned work example 1. (Work example 2) Between said anode (1) and the negative pole (2), it would in the state where SEPARATA (3) was made to mind, the electrode group (4) was formed, and a remained part manufactured the storage battery by the same method as a work example 1.

[0024] Furthermore, the defective fraction by the shot at the time of the early stages of the storage battery manufactured by this invention or charge and discharge is shown in Table 1, and the degradation rate of the storage battery by the cycle characteristic at the time of charge and discharge was shown in Table 2.

[0025] The upper and lower sides of the anode (1) manufactured by the same method as a work example 1, and the negative pole (2). (Comparative example 1) Without cutting in the state where it went around [the edge on either side], and performing any processings (Said anode (1). And the electrode group (4) was formed through SEPARATA (3) between the negative poles (2), and a remained part shows the defective fraction by the shot at the time of the early stages of the storage battery manufactured by the same method as a work example 1, or charge and discharge in Table 1, and showed the degradation rate of the storage battery by the cycle characteristic at the time of charge and discharge in Table 2.

[0026] The anode (1) manufactured by the same method as a work example 1, and the negative pole (2) at the start end and around which it is wound Auxiliary SEPARATA about 5mm in length. (Comparative example 2) And after making SEPARATA (3) mind, it would and the electrode group (4) was formed, and a remained part shows the defective fraction by the shot at the time of the early stages of the storage battery manufactured by the same method as a

[0077] The anode (1) manufactured by the same method as a work example 1, and nylon resin with which the quality of the material is different between the negative poles (2), (Comparative-example 3) And SEFARETA (3) was constituted from polypropylene resin, the electrode group (4) was formed, and a remained part shows the defective fraction by the shot at the time of the early stages of the storage battery manufactured by the same method as a work example 1, or charge and discharge in Table 1, and showed the degradation rate of the storage battery by the cycle characteristic at the time of charge and discharge in Table 2.

Table 11

	无源例 1	无源例 2	比参例 1	比参例 2	比参例 3
无源例 (总)	11	6	14	6	18
无源例 (分)	0	0	24	10	30

Table 23

	2000年1	2000年2	2000年1	2000年2	2000年3
2000 (80)	4	8	6	8	6
2000 (90)	8	6	12	10	12

[0021] Although illustration and explanation were given about the sealing cylinder-like nickel metal hydride storage battery in above-mentioned this example, it cannot be overemphasized that it does not limit to this, for example, can apply also to the storage battery of a square-shaped nickel metal hydride.

[Effect of the invention] As mentioned above, by making the insulating layer which has predetermined thickness form in the winding start end of an anode or the negative pole, the end part of winding, and an up-and-down edge according to this invention While preventing

generating of the shot by contact of the anode accompanying the shock added from the outside of a storage battery, and the negative polarization of the defective reaction can be carried out (minimum), the life of a storage battery is further extended by this and the characteristic of charge and discharge improves by it.